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AUTHOR	Murphy, Dermot F.; Candlin, Christopher N.
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ABSTRACT

The interactive processes of university engineering lectures are analyzed from five points of view. Although the research is applicable to the study of lecturing in general, it is intended to have specific application to programs for students for whom English is a second language. A discourse analysis is based on models by Sinclair/Coulthard and Cook, which demonstrate the discursive nature and coherent features of lectures. An approach to textual criticism emphasizes cohesion, or the linking of elements within the test. A table of conjunctive relations is included. Kinesics is discussed in terms of role expectations and the need to coordinate the lecturing process with the environment in which the lecture is delivered. A script marked with the lecturer's gestures is included. Discourse analysis is coordinated with textual analysis to arrive at the specified structure of the lecture transaction. Finally, listening skills are examined in order to arrive at the role of speech perception in determining the communicative efficiency of lectures. Published listening comprehension materials are briefly reviewed. The document concludes with a discussion of note-taking, which summarizes the implications of this research for evaluating teaching methods and materials. (JB)

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ENGINEERING LECTURE DISCOURSE AND LISTENING COMPREHENSION

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Dermot F. Murphy
Christopher N. Candlin

Lancaster, 1979

Practical Papers in English Language Education, Vol. 2.

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BIBLIOGRAPHY

1. INTRODUCTION

1.1 The following paper was originally a research report which gave an account of the work carried out during the first year (1975-1976) of a projected two-year investigation sponsored by King Abdul Aziz University, Jeddah, Saudi Arabia as part of an overall scheme for developing communication skills in English among undergraduates in the Faculties of Medicine and Engineering, under the aegis and management of the British Council. We reissue it because despite its unfinishednature we believe that it contains some useful and perhaps stimulating suggestions for further investigation in the area and particularly with regard to materials development. We would also like it to achieve wider circulation among colleagues working in the field of ESP. In re-issuing the paper we have not undertaken the revision which would be necessary to update the content in line with our own present thinking; we have indicated some relevant work and publications that have come out since it first appeared.

1.2 Readers who are looking for practical hints may like to start with section 11 where we have summarised the implications we believe the research has for materials design and method. We hope they will then turn back to the preceding sections which provide detailed support for our proposals! Sections 4, 5 and 6 deal with linguistic approaches to the data; and in 7 we consider some paralinguistic elements of communication found in our data. The implications of some psycholinguistic research are evaluated in section 9. We begin in 2 with comment on the objectives and adequacy of the lecture method, and follow this in 3 with a survey of reported problems foreign students encounter in university courses.

1.3 The Lancaster research formed part of a three-University research programme attached to this scheme, with

the other research projects sited at the Universities of Birmingham (under Professor John Sinclair) and at Edinburgh (under Dr Henry Widdowson). The research at Lancaster concentrated on the area of listening comprehension in the lecture mode, that at Edinburgh on reading comprehension, and that at Birmingham with seminar interaction and, in a complementary way to the work at Lancaster, on the nature of lecture discourse. The connecting link between all three research programmes has been the concern with the analysis of the discourse in the communication of scientific and technological information in English in the setting of an overseas University.

1.4 As we have indicated, the research programme at Lancaster was originally conceived in terms of a two year scheme; the first year being devoted to the collection of data from authentic sources (in our case from lectures on Engineering topics); the establishing of a workable model of discourse analysis which could be applied to the collected data, using 'discourse' as a term for the description of the overall meaning of a text and the relative significance of its constituent units; and an examination of the implications of such an analysis for the devising of listening comprehension exercises for Saudi university students in the light of presently existing pedagogic materials. The report which follows relates to all these topics, clearly acknowledging continuing debt to other work in the applications of discourse analysis to the solution of pedagogic problems, while carrying the field further in an area which has hitherto been largely unresearched, that of listening comprehension. In that the second year of research has not proved in the event to be possible, the research programme is incomplete. We have not been able to move in detail into the area of greatest practical relevance, namely the formulation of pedagogic procedures for listening comprehension in an

Engineering lecture setting which would derive directly from the understanding of discoursal listening as an ongoing accomplishment. The need, however, to shift the bias of listening, in the context of an ESP programme, from the speaker to the hearer, the need to take account of how he speculates about possible outcomes of the message he is comprehending, the need to examine his developing perception, are all important questions which the research report brings to the fore, and the line which exercises in listening comprehension must follow emerges clearly. In the research programme, as it was originally envisaged, we would have tested our hypotheses in field conditions. However, we hope that this report can be used as an instrument of analysis in appropriate teaching-learning contexts.

1.5 Most of all, however, this report is an exercise in applied linguistics, examining as it does the bases of a widespread practical problem, that of comprehension of spoken language, and in its concentration on discourse making a contribution to our general linguistic understanding of supra-sentential structure. It is a problem of universal relevance to the teaching of language, not merely of English for Special Purposes, and we are grateful to our sponsoring body, King Abdul Aziz University, and to the administration of the British Council for making the beginnings of the overall research programme possible.

1.6 We would also like to record our gratitude to members of the Department of Engineering at Lancaster: to Professor Harris for arranging contacts, and to himself, Mr Crossley, Professor French and Dr Hanneford for permitting us to record their lectures, giving time to discuss their courses and for the interest that they showed in the project. Finally we owe our thanks to Gonny Crowe for all secretarial work, calmly and efficiently done, and to Sue Foster for assistance with the long task of transcribing the lectures.

2. LECTURES

2.1 It seemed important to take account of recent considerations on the use of the lecture as a teaching method. Bligh (1972) provides a summary of findings in educational research and makes a number of proposals for improving the effectiveness of lectures as a teaching method. Such proposals gain in importance when we consider the difficulties that foreign students are known to encounter with the method (see below 3).

2.2 The findings summarised in Bligh suggest that lectures are not an effective way of stimulating thought or of bringing about a change in the opinions of an audience; they are about as effective as other methods (such as tape-slide) for conveying information. Since the Communication Skills in English Project set out to introduce the Saudi students to an active participatory science through discovery and enquiry, it would seem that this somewhat dogmatic method of conveying information may clash with some of the professed aims of the course. However, it will not clash with the aim of equipping the students to cope with the programme of lectures they will meet later in their University careers, although it seems as well not to forget that the method is too often accepted unquestioningly:

> (it) is arguably the most widely used (and abused) method of teaching and learning used with groups, irrespective of whether it is successful, effective or valid (Peter Smith THES 30 April 1976).

From the information we were able to gather it appeared that the role of lectures in the Engineering courses in Lancaster and Jeddah were similar. The lectures fitted into Bligh's acceptable category: their aim was to convey information, not to stimulate thought as might be the case in an Arts subject lecture.

2.3 This is how the Engineering Department at Lancaster described its teaching methods to applicants for undergraduate places:

> Lectures, which are the principal means of teaching, are supplemented by seminars, examples classes and other methods chosen to present the subject matter as effectively as possible.
>
> There are series of short written problems on the material of the current lectures. While some of these, intended to fix new ideas, are of the familiar, purely-analytical type, others require ingenuity, design or judgement for their solution. These 'creative' problems are intended to develop the art and discipline of thought of engineering as well as just the engineering science side.
>
> All students are allocated to groups of three or four, each group spending one session each week with a member of teaching staff. This system enables students to receive help with work they find difficult, and maintains close and friendly relations between staff and students.
>
> Practical Work
>
> There are few routine laboratory experiments, but instead projects in which individual students or small groups of students grapple with problems typical of those in real engineering, resorting to the laboratories for help in solving them. One first year project is to design, build and test to destruction a small steel structure (each design is 'costed' and the cheapest to stand up to the specified load wins). Other projects early in the course include the design, building and testing of a transistor amplifier, a heat-exchanger and a control system for a lift, and the design of a prestressed concrete bridge, followed by tests on a scale model. Later projects are often chosen by the students themselves.
>
> (Engineering at Lancaster 3rd edition April, 1975)

We may note that by implication the lectures are seen as the main means of teaching, being 'supplemented' by other methods.

2.4 Such 'Engineering taught by example' (Alan Cane THES 30 April 1976) requires that students synchronize their lectures with practical work, and for that a reasonable number of teaching rigs have to be available. For the purpose of this project it is important to add that the information input to the courses seemed to be almost entirely from the lectures at a primary level. Handouts from the lecturer supplemented the notes and examples written up on the blackboard, certain textbooks might be recommended, but for students at Lancaster the lectures played a crucial part in their courses as the major source of information.

2.5 It is appropriate to note here the growing concern with the role of language and communication studies in engineering evinced in the work of Marples (1974), Bundy, Luger & Stone (1975), Fisher and Kirkman (1978) among many others. It is a concern which spreads beyond engineering studies to the profession (eg Wright 1977ab). These are concerned with the problems of the native speaker.

3. FOREIGN STUDENTS AND UNIVERSITY TEACHING METHODS.

3.1 Studies by Holes, Morrison, James and Wijasuriya all emphasise the difficulties foreign students on university courses in the UK have in understanding the lectures which they must attend.

3.2 Morrison (1974) investigated 'problems in listening comprehension encountered by overseas students in the first year of postgraduate studies in sciences in the

University of Newcastle upon Tyne' The differences between the subjects of his study - their academic record, selection, ability in English - and the students at KAAU need no emphasis. His aim was to identify listening situations which were important for his subjects, rate their relative difficulty (which was done by questionnaire) and to identify linguistic features which caused difficulty (questionnaire and test). In order of difficulty the situations were:

1. seminar/tutorial
2. informal lecture ('high informational content but not necessarily in highly formal register')
3. formal lecture (formal register, close to spoken prose)
4. individual discussion.

3.3 Lectures recorded at Lancaster would probably fall into category 2. Linguistic features giving difficulty were classified under the headings (in order of difficulty):

1. the referential system (anaphora etc.; transition markers; logical connectors)
2. lexis (especially idiom and nominalized groups)
3. phonology (elision, reduction, intonation, regional accent)

3.4 Holes (1972) investigated 'some aspects of the English language problems' of overseas postgraduate students at the University of Birmingham. He found that a major initial problem was difficulty in coping with lectures in English. He devised short listening comprehension tests based on taped extracts from real lectures to ascertain perception of message content, and understanding of particular lexical items. He emphasized that many problems were caused by students' being unaware of culture-bound knowledge*, by

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* cf Hutchinson & Waters 1979 for consideration of the practical implications of this gap in preparing students for technical education.

their inability to interpret either the speaker's intentions, or stress and their being unaware of changes of register. Holes points out that speech has a lower level of redundancy for the foreign speaker than for the native.

3.5 Wijasuriya (1971) made a rather different approach to defining the problem; taking a definition of discourse based largely on Hasan 1968, and Halliday, McIntosh and Strevens 1964 he examined a large corpus of lecture text to categorise the logical connectives and discourse markers that occurred in it. He next examined listening comprehension tests and a number of general coursebooks for ELT to see how far they exemplified or tried to teach these connectives and markers. If such features occurred in tests, then they were not among the items candidates were expected to be able to discriminate. In general, textbooks were similarly lacking.

3.6 The studies we have just cited include recommendations for English language courses for foreign students, and particularly in listening comprehension, some of which we will summarize here since they are a concomitant part of these studies.

3.7 Wijasuriya proposes a number of exercises to develop understanding of anaphoric and cataphoric reference, the semantic functions of logical connectives and of discourse markers. For the latter he suggests a hierarchy of importance so that the student can recognise an aside and realise it requires little or no attention, for example, whereas a gloss may be of use to him if he has not grasped a point the first time it was made. The exercises he describes would be useful in the early stages of an advanced Listening Comprehension course.

3.8 Morrison concluded that many of the difficulties his subjects had with understanding continuous spoken discourse were due to inability to recognize discourse markers or to perceive logical relationships. His tests were conducted at intervals throughout one academic year and phonology was found to be a persistent difficulty even after exposure to lectures, so he recommends ear-training as a priority in developing study skills. Students need to learn to interpret language which is not just spoken prose in their language courses, and this implies a need for teaching materials which are based on functional teaching materials derived from a descriptive analysis of spoken discourse.

3.9 Holes' conclusions repeat the need for discourse analysis to serve as a basis for materials to be used in study skills course.

3.10 These studies share similar views on some of the reasons why foreign students find difficulties in understanding lecture courses given in English. They identify the general failure of teaching materials (and therefore most teaching?) to provide texts which show the rhetorical features of authentic speech, and consequently to train perception of linguistic features essential for easy interpretation of a speech chain. The demoralising effect of finding themselves unable to cope with lectures may be lasting for certain students (James 1975).

4. DESCRIBING THE DATA

4.1 We are aware of a number of problems which have been identified by the studies outlined in the preceding section. Various suggestions have been made about ways of solving the problems, although the solutions are not worked through in detail in any of the studies. This was not the aim of the studies; nor can it be an aim of

this study. Any solutions we propose need to be grounded on an adequate theoretical characterization of the nature of the discourse of lectures. Adequate for the applied linguist means something that will reveal principles that are pedagogically significant and capable of interpretation in practical terms. 'Pure' theories are not always adequate in this sense, however considerable their implications may be for general linguistic theory (and underlying principles of applied linguistics); we are thinking, for example, of attempts to use Transformational Grammars in language courses. It is possible to make certain a priori statements about the nature of an adequate theory for the task in mind, and to indicate how far current models match the prescription.

4.2 Because we know what our ends are in terms of expected learner achievement, we can specify the nature of the ideal descriptive model. Basically it will be a model of listener interpretation; it will be able to 'react' to certain specified signals of the speaker to interpret his intentions and to extract the message/information from the text he generates; it will be able to specify a limited range of listener expectancies at any point in the text, showing how, guided by the speaker, the listener has at the back of his mind what it is that he is going to hear next, and can interrelate non-sequential parts of the speaker's message. This notion will become clearer after the section on listening the speech perception (see 8, 9).

4.3 The potentially relevant areas of linguistic theory appeared to be discourse analysis, cohesion, intonation and kinesics, and from psycholinguistics, studies of speech perception. Some areas have received less attention than others to avoid reduplication of work being done at the University of Birmingham by Martin Montgomery. This

is one reason why we have made no systematic study of intonation features of the Lancaster corpus, and would recommend that this paper be read in conjunction with Montgomery 1977 and Coulthard 1977, particularly Chapter 6. As Montgomery points out "intonation is a complex resource used by the speaker to signal the direction, organisation and informationally significant aspects of the discourse" (p. 128). The system of description he uses relies heavily upon that of David Brazil (qv). It is worth noting that an informal examination suggests that the Lancaster data would support the findings at Birmingham (see Montgomery; Brazil 1975).

5. DISCOURSE ANALYSIS - COHERENCE

5.1 The most relevant work for consideration in relation to our corpus was obviously that of Sinclair and Coulthard 1975, and the analysis of 'extended monologue discourse' based on it which was made by Cook 1975, which is still the most relevant analysis of this level for the applied linguist. It is possible to show that lectures share features which are characteristic of other forms of classroom discourse. The rhetorical structure of a lecture is not identical with that of primary classroom discourse, but many of the elements are common at the various ranks of organization. These features are also shared by seminar discourse (personal communication, Richard Mead), which is indicative of the integrated language skills the students at KAAU have to acquire: mastery of study skills, competence in what might be called 'didactic discourse' - the discourse of all teaching/learning situations.

5.2 We implied above that the Sinclair/Coulthard model of discourse analysis would require little adaptation in order to be used to describe the structure of lecture discourse.

Indeed, from the data of our corpus we can fairly easily exemplify certain of the acts found in this model:

marker:	Well. Obviously...
	Right. Everybody...
	Now. Let me...
starter:	Well now. Let's get on with the engineering.
elicitation:	I think that most of you have met the result before, have you?
	(this act may be felt to require redefinition since it does not get the linguistic response Sinclair & Coulthard specify; it does get a paralinguistic response, as the speaker's next act shows:)
accept:	Yes. Good (= evaluate)
informative:	for the three forces to be in equilibrium, their vectors must form a closed triangle
comment:	more usually known as the triangle of forces
aside:	running out of blackboard here
metastatement:	let me sound reveille, I want to mention two types of generator
conclusion:	So there you've got 3 forces which are in equilibrium.

5.3 If we describe a text using the full rank scale we find that we seem to have analysed classroom interaction in which the teacher is talking to himself. Many people might find this a valid judgment on the lecture method. Nonetheless we feel that this fails to bring out the interactive nature of lectures: speaker and audience are face-to-face, and few lecturers can be so insensitive as to be unaware of all the reactions of their hearers. We can only speculate how far individual lecturers react to the non-linguistic signals from their audiences, i.e. interact. Many lecturers signal solidarity with their hearers through such linguistic devices as use of the second person pronoun and the first person plural pronoun:

-If you're doing analysis...

(an impersonal use it can be fairly argued; we would still consider its use to convey more empathy than the use of 'one')

-Do you put it...

-I won't trouble you with that...

-So far we've...;

they are aware of speaking to someone. This point will be developed further in the section on kinesics (see 7).

5.4 A number of points must be made in relation to the above comment. The lecture does apparently conform to the kind of situation where discourse of the sort classified by Sinclair & Coulthard's model is to be found:

> fairly formal situations... (where) one participant has the floor whenever he wants it (Coulthard 1975)

which is certainly true of the lecture.

Next comes a distinction between lecture and classroom: the lecturer always wants the floor, and his audience are not meant to join in the interaction verbally* whereas Coulthard says of classroom discourse that it 'progresses mainly by question/ answer sequence' (ibid). The dominant participant in the discourse can invite the participation

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* Obviously this is not a categoric definition; there will be interruptions from the audience for clarifications:

-Could you use a large k instead of the small k in front of the ohms?

and some lecturers may adopt a more classroom-like approach on occasion:

L: what current do you get
S: infinite

L: what do you get the resistance at. what units is it in
S: milliamps.

of any or one selected member of his audience; part of his role in the discourse is to regulate this exchange. It is worth considering to what extent the lecture may, on occasion, proceed in the same manner, with the lecturer providing dummy responses and sometimes feedback:

> -well how do you use that. er. to combine forces together. well the simple rule is that. if other forces are resolved in the same directions...
>
> -youve taken. this. rather more complicated three-mesh circuit. and reduced it to. a single mesh circuit. and if youre interested. in the current flowing in R. six. thats excellent thats find just what you want.

A sort of one-man-classroom performance, which is not unknown in the classroom either, when a domineering teacher takes over the interaction. The lecture shows other characteristics of 'didactic discourse', including the focussing move which Coulthard says is 'almost certainly unique to teacher dominated discourse' (ibid):

Class of move	Text	Structure	Class of act
Focus	now	(s)	marker
	let me sound reveille	(pre-h)	starter
	I want to mention two kinds of generator	h	metastatement
	voltage generators and current generator	(post-h)	comment

5.5 There are, then, good grounds for suggesting that the texts of our data fit into an established area of discourse study, and that differences that distinguish lecture from classroom discourse will be of degree and not of kind. The already apparent degree of match confirms that in the lecture, as in other forms of social interaction we are dealing with a regulated setting whose structure is predictable. It was certainly the intention of Cook (1975) to demonstrate this in his analysis of 'extended monologue discourse'.

5.6 Cook begins by showing how attempts to define register (eg Halliday et al 1964) fail to reveal how pieces of discourse function as such since 'linguistic features do not correlate in any neat one-to-one way with the situational variables in an extra-linguistic context'. He cites Mitchell's 'Language of buying and selling in Cyrenaica' (1957) as an example of the inadequacy of considering only syntactic patterns to characterise a discourse setting since those identified are only those associated with the ritual aspects of the transaction, 'leaving much to explain'. Following Widdowson he emphasises the need to consider not only cohesion in analysis of texts, the description of 'linguistic elements at a supra-sentential level'* but also 'the communicative use to which utterances are put in the performance of social actions', textual coherence.

He defines the lecture as a monologue situation in which one protagonist is 'responsible for almost all the verbal contribution to the discourse', adding that it is neither possible nor desirable to specify what 'almost all' should mean. This difficulty would support the claim to consider the lecture as only a special form of didactic discourse. Then in linguistic terms he takes Abercrombie's definition of monologue as 'the use of spontaneous spoken language, not prepared but created as it goes along'; that is to say that in contradistinction to spoken prose (the recitation of a prepared reading), monologue is produced in real time. Thus his definition would correspond to Morrison's informal

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* This is not a definition with which Halliday & Hasan would agree, considering that cohesion is concerned rather with describing 'relations of meaning that exist within the text' 1976:4.

lecture'*.

5.7 Cook's observation that the unadapted use of Sinclair & Coulthard's discourse model to describe lecture text produces 'long strings of undifferentiated informative' acts is easily demonstrated. However, it is unquestioningly taken as the model for adaptation to describe 'the lecture used for data'. Cook proposes an equivalent rank scale, offering the same possibilities for increasing delicacy of description at different levels:

Sinclair & Coulthard	Cook
Lesson	Lecture
Transaction	Exposition
Exchange	Episode
Move	Move
Act	Act

5.8 Starting with the largest element of discourse, each successive rank is specified in terms of a structure composed of elements at the next rank; that is to say that an Exposition, for example, is specified as a structure realised by different classes of Episode. The terms chosen for ranks two and three emphasise the non-interactional nature of lecture discourse that is assumed.

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* Cook asserts that this is easier to understand, but as has already been stated that was not Morrison's finding. We might agree with Cook, since our expectation would certainly be that an informal lecture would contain greater redundancy; however, since the foreign student is unable to take advantage of this, his perception of the message is made very much more difficult. For many the less redundant formal lecture, carefully delivered may well be easier to understand. This is another reason why the spoken prose of most listening comprehension material is inadequate preparation for the student. cf 6.4 below and 9.

5.9 The structure of the first four ranks is given as follows:

I LECTURE

a series of Expositions with no specified structure

II EXPOSITION

the structure is realised by classes of Episode where P = expectation; O = focal; D = developmental; T = closing such that EXPOSITION $\longrightarrow$ (P) D O ($D_{2...n}$) T ($T_{2...n}$).

This formula states that the rank of Exposition is composed of one optional Episode of expectation, one obligatory focal Episode, one obligatory developmental Episode which may be followed by any number of optional developmental Episodes, and one obligatory closing Episode which may be followed by any number of optional closing Episodes.

III EPISODE

the structure is realised by classes of Move where F = focus; E = extension; C = conclusion; such that EPISODE $\longrightarrow$ F E ($E_{2...n}$) C where E 'is one or more Moves of classes other than focussing or concluding'.

IV MOVE

at this rank we will only list the categories; the motivation for this is explained below.

5.10 FOC focusing (cf Sinclair & Coulthard 1975: 27; example above);

CON concluding: a justificatory statement; a focal Episode with a concluding function; a summary statement;

DES describing: subdivided into description of processes and causal sequences; previous events; operations; states:

ASS asserting: assertion of fact, opinion, rule, physical law;
REL relating: making intra textual and extra textual relationships explicit;
SUM summarising: giving a resume of the immediately preceding discourse;
REC recommending: giving support to an opinion, course of action, method etc.;
JUS justifying: offering justification for a proposition, assertion, recommendation etc.;
QUA qualifying: placing reservations on, partially retracting from, prior assertion, proposition etc.;
CNT contrasting: drawing a parallel of comparison or contrast between a previous fact, event etc., and a second one contained in the statement that initiates the Move;
EXP explaining: expounding or making explicit a prior assertion, description, causal chain etc.;
the Listing Move he postulates only occurs once in his data, so 'a formal statement of structure does not seem justified' (p. 77).

5.11 We have not shown Cook's distinction between bound and free moves, nor detailed the subclassification he makes for some moves. His first listing alone is more than double the number of classes of Move in Sinclair & Coulthard. For several of the seventeen Acts identified he introduces subclasses, which double the total number of classes. On its own this observation has no critical force; Cook claims that the classes he establishes are well-motivated by his data. However, we find that they do not achieve a generality of structure of the significance which can be claimed for Sinclair & Coulthard. The Moves describe the constituents of the discourse at too delicate a level, their definition, as the list above reveals, often resembles the definition we expect for Acts, the only clear exceptions being the first three.

5.12 We do not intend to consider Cook's proposed fifth level of description in detail for similar reasons. Firstly for theoretical reasons: as Montgomery has already pointed out the work is unsound in respect to the criteria used for identification of acts. Let us consider one case, 'Marker',which is subdivided into 'Marker of Transition' which corresponds to the discourse marker act of Sinclair & Coulthard 'realised by a closed class of items' (1975: 40), which has a clear discoursal function to mark boundaries, and 'Marker of Contrast' which turns out to subsume comparison as well as contrast, realised by the items 'but, yet, whereas, however'. Cook admits that these are items of textual cohesion and says that they also serve as 'discoursal landmarks', showing that 'a point of transition or contrast has been reached' (p. 89) which is exactly their function in cohesion, an area he says he is ignoring (cf Halliday & Hasan 1976: 250f). It turns out anyway that 'markers are only optional indicators of transition and contrast' (his emphasis; p. 89), but we are left in doubt about how to recognise when this option is being exercised. At this level the proposed scheme of description becomes so very detailed that we feel on practical grounds it is over-elaborate to serve a materials designer. It does not appear necessary, either, for the student to be capable of consistent recognition of discourse structure at a level of delicacy below the move, although as we are assuming here, and will discuss later, it would be worthwhile to teach recognition of the marker. The finer points may be left to the theoretical student of discourse. We would suggest in any case that, as this merging of items of coherence and items of cohesion implies, the knowledge of cohesion which the student requires will equip him to interpret the lecturer's message at this level, perhaps even better than a knowledge of discourse structure. Cook himself only suggests teaching recognition of Moves.

5.13 The implication of this is that on a level of discourse the student might be taught to recognise

> now what I mean by that. is this.

as a focussing Move;

> that you take this network. you occupy the equivalent circuit for. and you put a perfect voltmeter on here.

as a describing Move;

> that you will measure the voltage across there. when no current is drawn. between A and B. that means. er open circuit. no circuit connected there at all (.)

as an explaining Move;

> right (MARKER). so thats the voltage across there.

as a concluding Move. It would be superfluous to detail the Acts of statement, sorting the assertives from those concerning operations or sequences, others about physical states and properties, from summaries or from justification. It is unlikely that a language teaching syllabus would permit such detailed preparation for the real aim of improving the students' understanding of language use.

6. TEXTUAL ANALYSIS - COHESION.

6.1 An adequate treatment of this topic in relation to our corpus would require a research project to itself. What follows is a necessarily cursory treatment; it

is based on the work of Halliday & Hasan 1976 and Wijasuriya 1971.

6.2 Unlike Discourse Analysis, Cohesion makes no attempt to identify structural elements above the sentence; it attempts to account for a different kind of relationship within a text, the relations of meaning which link one part of the text with the parts that have preceded. 'The concept of cohesion accounts for the essential semantic relations whereby any passage of speech or writing is enabled to function as text' (Halliday & Hasan 1976: 13). Five cohesive devices are considered: reference, substitution, ellipsis, conjunction, and lexical cohesion. We will examine each of these briefly and show how they may be exemplified from our data. An exhaustive study based on a large corpus of lecture text is to be found in Wijasuriya; we will return to his examination of tests and text-books and proposals for materials design in later sections.

6.3 Reference items in a text may be divided into those which are exophoric and those which are endophoric. Exophoric items are used to refer to the context of situation, and endophoric items are used to refer to the con-text: to other items within the text itself. The lecture constitutes an example of what Halliday and Hasan term 'language-in-action' where 'the text is likely to contain a high proportion of instances of exophoric reference' (1976: 34)*.

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* They continue by noting that 'it is often difficult to interpret a text of this kind if one only hears it and has no visual record available': the point we have noted below in Appendix para 5.

6.4 An examination of the text in the next section on kinesics lends considerable support to this observation:

> this is going to cost more to make.
> (as he says 'this' the lecturer touches a diagram on the blackboard.)

An exophoric item 'signals that reference must be made to the context of situation' (1976:34); 'but it does not contribute to the INTEGRATION of one passage with another so that the two together form part of the SAME text' (their emphasis; 1976:37). Wijasuriya found that reference items - which may after all be either endophoric or exophoric as determined by the particular instance of their use - when they were used in language teaching courses were almost always exophoric and consequently gave the learner no opportunity to understand their endophoric use.

6.5 The intratextual use of reference items may be divided into two occurrences: backward reference, anaphora, and forward reference, cataphora. Cataphoric reference, like the discourse focussing move is a warning of what is to come, and may well be contained in the latter:

> lets put it this way

where 'it' refers to the statement of Ohm's Law that is about to be given. Anaphoric reference may prove more difficult for the foreign student as it expects him to link up different parts of the text. The significance of this task will be more obvious when we have discussed speech perception; in brief, the understanding of anaphoric reference may place an

excessive load on the foreign student's untrained short term memory. If, as Wijasuriya suggests, the learner's early language training will not have equipped him for this, then the problem is considerable.

For example in

> the proof of that is. fairly simple if you need one.

'that' refers to the effect of applying a moment to a body, discussed in the preceding statements.

6.6 This last example is a case of demonstrative reference, which is realised by the demonstrative pronouns, and the definite article which signals identity of reference with some preceding item as in:

> in a circuit. containing any number.of generator. (aside) the. currents and voltages. eh. produced in the circuit

where 'the circuit' refers to 'the one just mentioned containing any number of generators'. The authors also distinguish personal reference, made through the use of personal pronouns and possessives, and comparative reference. This is realised through the use of adjectives such as 'same', 'similar', 'other', 'different', 'better', and adverbs such as 'similarly', 'differently', 'less' or 'equally'. An example from lecture eight is:

> and likewise with the. vertical components

where 'likewise' is to be interpreted as meaning that 'all I have just said about the other vectors is true of the vertical forces'. Examples are plentiful:

> -I'll rewrite that slightly differently.

This form in particular seems likely to give problems to the foreign learner.

6.7 Evidence for the importance of mastering cohesive reference comes from studies of language disturbance. In a study of semantic aphasia Roman Jakobson notes that:

> pronouns and articles may depend on a wider context than the bounds of the sentence. Since semantic aphasia pertains to similarity disorders, it is not surprising that the regulation of anaphoric pronouns and articles may be lost, eg 'My wife is not here today. He did not come with me' (1971: 87; his emphasis).

Language learners who have not acquired (rather than 'lost') the necessary similarity order are quite common. This error may be one of a developmental order, just as other speech disorders mirror development, but in the case of some learners doubt must remain, about whether they were ever exposed to the relevant language features.

6.8 Substitution is defined grammatically rather than semantically since 'the criterion is the grammatical function of the substitute item' (1976:90). The relationship is to be found in the rewording of a noun, a verb or a clause. The list of items used for such substitutions is short:

Nominal:	one;	ones;	same	
Verbal:	do			
Clausal:	so,	not		(1976:91).

These may be exemplififed from our corpus by

-very straightforward case exactly the same. as I drew up. a moment ago.

-you can do it the other way round

-I maybe use that because most people do

-have I got that. wrong. I hope not.

6.9 Ellipsis can be considered simultaneously since it is defined as 'substitution by zero' (1976:142). This will be understood from the consideration of some examples:

so the magnitude of one force. then defines
the magnitude of the other two

where 'forces' is elided after 'two';

whatve we got to do now. think of some.
more systematic way

where 'we've got to' is elided before 'think'. Ellipsis is a more common feature of verbal interaction but many forms of substitution will be unfamiliar to students who come from language classes where 'full answers' were the rule, where substitution would only be permitted in a drill for 'short forms' and ellipsis accounted a dangerous error.

6.10 The conjunctive elements are not cohesive in the same way as the items in the text that precedes, or follows, implying that the person receiving the message must supply 'the appropriate word or words already available' (1976: 226). Conjunctive elements 'express certain meanings which presuppose the presence of other components in the discourse' (ibid); and 'in describing conjunction as a cohesive device, we are focusing attention not on the semantic relations as such, as realized throughout the grammar of the language, but on one particular aspect of them, namely the function they have of relating to each other linguistic elements that occur in succession but are not related by other, structural

means' (1976: 227). It is not possible to summarise the discussion of conjunctive relations adequately and show the exemplification which is possible from our data. We reproduce here the summary table of these relations from Halliday & Hasan (see p.27).

6.11 It seems most important here to draw attention to the adversative and causative conjunctions and the signalling role that these should acquire, in discourse terms, for the foreign learner. Some, such as the simple causatives: 'so', 'then', 'therefore' may be introduced as marking concluding moves in the discourse:

> and so the rest of the triangle. is defined. there. and there. so the magnitude of one force. then defines the magnitude of the other two.

The causatives signal that what follows will be items of information that the learner will need to retain; so his concentration, and endeavour to memorise what follows must be increased in comparison, say with what follows a complex, de-emphatic additive: listen hard for this:

> then the voltage across there. is clearly proportional to R_2

as against

> but never mind. so long as we know what we mean

Adversative correction of meaning will also signal important information, requiring attention to what follows, and the rejection of what preceded:

Summary Table of Conjunctive Relations

	External/internal	Internal (unless otherwise specified)		
Additive	Additive, simple: Additive *and, and also* Negative *nor, and . . . not* Alternative *or, or else*	Complex, emphatic: Additive *furthermore, in addition, besides* Alternative *alternatively* Complex, de-emphatic: Afterthought *incidentally, by the way*	Apposition: Expository *that is, I mean, in other words* Exemplificatory *for instance, thus*	Comparison: Similar *likewise, similarly, in the same way* Dissimilar *on the other hand, by contrast*
Adversative	Adversative 'proper': Simple *yet, though, only* Containing 'and' *but* Emphatic *however, nevertheless, despite this*	Contrastive: Avowal *in fact, actually, as a mater of fact* Contrastive (external): Simple *but, and* Emphatic *however, on the other hand, at the same time*	Correction: Of meaning *instead, rather, on the contrary* Of wording *at least, rather, I mean*	Dismissal: Closed *in any case, in either case, whichever way it is* Open-ended *in any case, anyhow, at any rate, however it is*

	External/internal	Internal (unless otherwise specified)		
Causal	Causal, general: Simple *so, then, hence, therefore* Emphatic *consequently, because of this* Causal, specific: Reason *for this reason, on account of this* Result *as a result, in consequence* Purpose *for this purpose, with this in mind*	Reversed causal: Simple *for, because* Causal, specific: Reason *it follows, on this basis* Result *arising out of this* Purpose *to this end*	Conditional (also external): Simple *then* Emphatic *in that case, in such an event, that being so* Generalized *under the circumstances* Reversed polarity *otherwise, under other circumstances*	Respective: Direct *in this respect, in this regard, with reference to this* Reversed polarity *otherwise, in other respects, aside from this*
Temporal	Temporal, simple (external only): Sequential *then, next, after that* Simultaneous *just then, at the same time* Preceding *previously, before that* Conclusive: Simple *finally, at last* Correlative forms: Sequential *first . . . then* Conclusive *at first . . . in the end*	Complex (external only): Immediate *at once, thereupon* Interrupted *soon, after a time* Repetitive *next time, on another occasion* Specific *next day, an hour later* Durative *meanwhile* Terminal *until then* Punctiliar *at this moment*	Internal temporal: Sequential *then, next, secondly* Conclusive *finally, in conclusion* Correlative forms: Sequential *first . . . next* Conclusive *. . . finally*	'Here and now': Past *up to now, hitherto* Present *at this point, here* Future *from now on, henceforward* Summary: Summarizing *to sum up, in short, briefly* Resumptive *to resume, to return to the point*

Halliday & Hasan, COHESION IN ENGLISH, Longman 1976, pp 224-3

on the contrary, that is quite sufficient for most engineering problems.

6.12 Wijasuriya quantified the occurrences of each class of conjunction in his corpus, and comparable information from this corpus would be useful for selection purposes.

6.13 The final area considered by Halliday and Hasan, lexical cohesion, is of greater theoretical than pedagogic interest. Under this heading they consider 'the cohesive effect which is achieved by the selection of vocabulary' (1976: 274). Sinclair and Montgomery have pointed out to us the significance this device may have in arriving at a satisfactory definition of a discourse structure for chunks of lecture text at the rank of the exchange. They note that through the exchange the speaker will increasingly reiterate items in referential terms, and then relexicalise at the start of the following exchange. This point does suggest that the levels of coherence and cohesion should both be considered and we would envisage evaluating the effect of teaching certain items as examples of one level rather than the other.

6.14 The phenomenon will certainly be of importance for the student since it ensures that the redundancy of the message is reduced, and consequently increases the possibility of its not being understood.

7. KINESICS

7.1 The important role of information displayed on the blackboard during lectures in engineering prompted examination of the relationship between text, visuals and kinesics. From these considerations it is possible to suggest a number of implications for the design of listening

comprehension exercises. The diagrams and comments or examples written on the blackboard by the lecturer form the core (and sometimes the entire body) of the notes which students take away. These visual elements of the lecture are closely integrated with the (spoken) text and have a crucial part in the development and explanation of the information exchange. They contribute to clarifying reference and exemplification in the text, making much of the reference exophoric, as was noted in the preceding section. It seems essential then that Listening Comprehension materials should match this integration of speech and visual materials, without forgetting the caveat in the previous section (6.4 & 6.5).

7.2 We will first consider some relevant points from the literature on kinesics, and then present some notes on a passage selected for comment from the data recorded at Lancaster. Next we will show how this exemplifies certain aspects of paralinguistic behaviour, and finally we will suggest some conclusions we might wish to draw for the design of Listening Comprehension materials for an ESP programme.

7.3 Most considerations of behaviour in face-to-face situations, and particularly experimental investigations, have examined the behaviour of dyads, and not that of one speaker addressing a large group of listeners who are most unlikely to participate verbally in the interaction. However, studies of dyad behaviour may be revealing of suggestions why such apparently monodic behaviour is in fact only a special form of classroom interaction, as we have already suggested above in the section on Discourse Analysis.

7.4 Assumptions common to any classroom may be thought to serve as immediate explanations for this behaviour: the

speaker knows something his audience do not, so they listen while he tells them; on a practical level the number of potential interlocutors is usually too great to permit general participation in verbal interaction. But these are not sufficient explanations. Some of the audience may already know much of what is to be said, why then do they not join in? Interruptions to request explanations of what has been said are unusual, which seems to imply an improbably successful transfer of new information to those of the audience who were not familiar with the topics of the lecture. The audience do not speak because they know they have gone to listen, and do not even need to speak when spoken to:

-You're all familiar with this. Aren't you?
(silence)
-Yes, good. So...

There may be more or less verbal interaction with the audience during the lectures but this will almost without exception be under the control of the lecturer. We will be considering a few of the ways in which he keeps this control and conducts a paralinguistic interaction with his audience.

7.5 Apart from shared behaviour norms, about what to do in lectures, there are elements of the formal organization which help to preclude verbal interaction. From studies of dyads we find that the physical distance separating speaker and hearer(s) has a function of marking intimacy (Hall 1964); this is something which in a lecture is generally prescribed so that the separation keeps the speaker outside the intimate range of his audience, at a 'public distance'. Then 'the voice is loud but not full volume... choice of words and phrasing of sentences is much more careful and there may be grammatical (or syntactic)

shifts that differentiate speech at this distance' (ibid). Distance will also put the audience at ease since spatial segregation relieves stress (Sommer 1965), here it may be the stress of feeling that they ought to participate (but would obviously work inversely for those who want to). Hall's observations are reinforced by the way lecturers will change their voice quality when making an aside, or (as we have seen), walk right out in front of the demonstration bench to get closer to the audience during the aside, physically marking the less formal nature of his remarks.

7.6 Faced with lecturing in a small room which will not permit the preservation of public distance the lecturer can always assume 'public' voice to help preserve his status, but other factors will also ensure that this occurs. The fact that the lecturer stands rather than shares the posture of his audience, and that a table or desk is placed between them show the difference in status (Scheflen 1964; Mehrabian 1968). However, having set up a situation in which one participant in the interaction will be allowed to dominate without either making the audience uneasy about their non-participation, or questioning of the speaker's domination, there must be some compensatory manner of ensuring that the speaker holds the audience's attention, that they interact in their role as listeners. Individuals in the audience may not talk out loud to each other, or even whisper too many comments; it is not good form to fall asleep (unless this expresses a general criticism of the lecturer, when it is excusable because amusingly apposite). The audience want the speaker to show that he is aware of them, and talking aloud in their presence is not enough to show this. Since a number of distancing effects can be achieved it seems likely that the speaker must now use some of the means of showing contact with his hearers that are current in intimate interactions. Eye-contact is necessary for feedback from the audience, and at the same time 'places

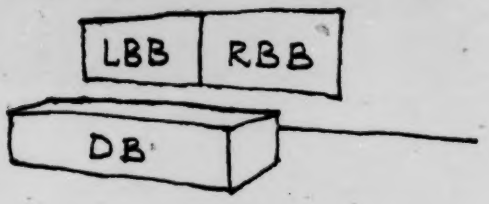
a person under some obligation to interact' (Argyle & Dean 1965); so this appears likely to link speaker and audience. The use of gesture may also show that the speaker is aware of his audience as participants in an interaction; his use of gaze-direction and body movements will also convey information (Kendon 1967; Scheflen 1964).

7.7 Here there is a problem for the applied linguist, for there is ample evidence to show that kinesics are culture-specific rather than universals (La Barre 1947), and they are as much something to be learned as the language of culture; individuals must 'perform them correctly if they are to be comfortable... in their world' (Scheflen 1964). As Abercrombie has remarked, we must examine not only spoken language but paralinguistic phenomena if we intend to consider the 'total system of communication' (1968), which is certainly what the language teacher will intend his students to acquire. We are only aware of one attempt to provide the second part of the total system for foreign learners of a language (Green 1968).

7.8 The text taken here to exemplify our findings is from a video-recording of a lecture by A. N. Crossley given to first-year undergraduates in the Department of Engineering at the University of Lancaster. It has been possible to support some of the findings we record here from notes taken in other lectures given by different people, and from data made available to us by Martin Montgomery at the University of Birmingham. Any points we infer from them are obviously culture-and discipline-specific. Our aim in examining this aspect of behaviour in lectures has also been to obtain information of use to an applied linguist, and not to further the study of kinesics. This study has not been exhaustive even in its own terms; the area it examines is so little considered that any remarks must be tentative. It is now getting

more careful examination and we may expect the little information at present available to applied linguists to increase (cf Riley 1975). In 7.9 we give the notation to be used to describe the speaker's actions; diagrams and notes written on the board, and sketches of gestures. In 7.10 kinesic notation and spoken text are recorded together; the length of gaps in the text are dictated not by pauses (shown by a period) but by the space required by the notation.

7.9 STRUTS from a lecture by A. N. Crossley (Lancaster) 4m 3



LBB - left hand blackboar
RBB - right hand blackboa
DB - demonstration bench

l = left (hand) c = centre r = right (hand)

E = picks up eraser

C = cleans blackboard

T = touches

TxU = touches & outlines shape of diagram x

D = draws/writes

P = points to

S = shakes chalk in hand

GD = gaze direction

x = eye-contact with audience possible

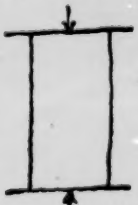
... = continues

Ø = (diagram erased 1½ minutes before the start of this p

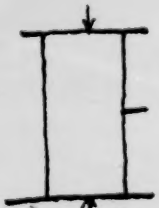
long thin member

fails by <u>buckling</u>

1



a



b

c

material sa
at the end
better used
the middle.

2 ideal strut is cigar-shaped

a

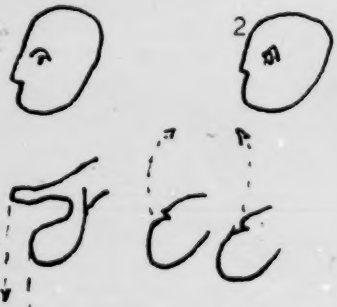
more expensive be
of shape

3

a

b

H1



7.10 Lecturer cRBB walks cDB; examines notes; glances RBB
eh. well I
x
said quite a lot yesterday on. eh. real ties. on how you
connect them. just spend a few minutes looking at real
EC1cLBB.D1, 1LBB x
struts. if you put a load on a strut
glance RBB GD1 PØ
like that. the biggest danger is probably
this. eh. phenomena of buckling. or bending sideways.
x
I think its fairly obvious that. the fatter this thing
T1 x.....
is in the middle the more resistant it will be to being
..... D1a x
bent sideways. again I think you can probably. eh.
T1 x
visualize that theres not such a great effect at the
ends. eh. to bend sideways. and so why not save some
T1 T1 x D1b
material at the ends and put it in the middle instead.
so the material there at the ends is better. more
D1c E
efficiently used if it is put in the middle. and so an
CrLBB ..... x H1
ideal strut. eh. an ideal thin-ended strut. isnt a uniform
thickness all the way down. its probably more cigar-
D2rLBB x..... x
shaped. something of that sort. now. its the same
T2 x x
old story. eh. this is going to cost more to make than.
T1U x
the straight one. and so its a question of balancing
x x
savings in materials against savings in manufacture.
T2 D2a..... x
so this will certainly always be a more expensive. for

example if youre making that out of concrete youd have
to make a mould which wascurved. and that always
causes difficulties. whereas if youre making a straight
one. you can just use straight pieces of wood. and it
might be cheaper to put in extra concrete at the ends
there than make a. nice shape like this. so the usual
rule is. unless youre going to make very significant
savings. by making them cigar-shaped. then you dont
bother. so you dont see a lot of. eh. structures like
this. but there are a few around. especially the
older one. again. eh. station roofs. the one in
Lime Street. youll see struts in the roof. made like this.
single. eh. bars of steel. and theyre bowed out into cigar
shape. theyve got other bits of steel across. to hold
them all in position. and thats a fairly. eh. common
sort of strut in older structures. you sometimes see this
in. eh. concrete buildings. but usually the sort of more
architectural ones. the concre. concert halls. that sort of
thing rather than. the run of the mill. office building.
now one advantage the strut has over. the tie is

that you dont have to start drilling holes in. or many
D3b.....
holes in to get the. to get the load in. you can just
..... x
press on the end. so you dont often have the same
Sx.....
difficulties with connections. in building struts that
lRBB walks cDB; examines notes; glances
you do with ties.
at LBB

(nb. ANC is left handed)

7.11 If the spoken text is considered in isolation it is evident from a number of linguistic features that the speaker was making exophoric references:

-If you put a load on a strut like that

presupposes that a strut, model or diagram is visible to all those taking part in the interaction. The pattern recorded here is fairly common: the lecturer presents a diagram which he then describes or comments on, and as his argument or description progresses he modifies or redraws the diagram, drawns other diagrams and writes notes.

The visual information presented is no more than is appropriate, and important comments (also formulae or calculations) are recorded on the board:

-material saved at the end is better used
in the middle.

7.12 Most hand gestures are used either to link the text to a specific diagram, part of the diagram, or to illustrate what is being said. They are exophoric, making the item

of reference in the text explicit:

T2
-this will certainly always be more expensive.

Previous studies (see 3) have suggested that foreign students have difficulty understanding the use of reference; it seems likely that the difficulties they might encounter in comprehending an unillustrated text (whether written or spoken) would be greater than the difficulties found where the reference is in fact exophoric on many occasions. Some of the exophoric reference in this example occurs shortly after rather than concurrently with gestural indication of the referent:

D2a x
-..... for example if you're making that;

but must be accounted exophoric none the less. There are other examples of reference that do not refer to illustrated referents, and these are endophoric, coming within the categories considered in 6:

-you'd have to make a mould that was curved
and that always causes difficulties.

We would expect these examples to be less easily comprehended. Only once does the lecturer point to rather than touch or outline a diagram. Certain hand gestures dissociated from a diagram illustrate the concepts being mentioned:

H1 H2
-a uniform thickness -a mould

their illustrative value again appears helpful to a foreign student.

7.13 The other hand gestures recorded in this text, H3 and S, require interpretation and are not so overtly linked to the text. H3, a wave of the hand from the vertical with palm facing the body, to the horizontal palm up, accomplished with a slight lowering of the forearm, conveys something such as:

> -I am now going to offer the less acceptable alternative.

The second gesture, S, where the speaker shakes a piece of chalk in his cupped hand, held in front of the body with the forearm horizontal, suggests that the speaker may be nervous about his relationship with the audience and uses this to release tension (cf Linden 1976: 264).

7.14 Eye-contact has a well-defined part to play in dyadic interaction, and the amount of eye-contact maintained is found to be culture-specific (cf Argyle & Dean, Hall, Kendon). It serves to show affiliation, to gain feedback and to regulate turn-taking in a conversation. The latter function is virtually superfluous in a lecture, as we have already suggested*. It is not possible to judge what the speaker's eye-contact here meant to his audience in terms of attitude: for listeners with a Mediterranean or Arab cultural background it may have seemed to show a less positive attitude toward them than it did to native listeners (cf Hall, Mehrabian).

The eye-contact in this lecture can only be estimated from the video-recording: however, Argyle and Dean (1965) found this method adequately accurate. Eye-contact seems to

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(* We have insufficient data at present to see whether interruptions in lectures respect conversational norms: i.e. the person interrupting waits for an appropriate point to take his turn, or whether he does interrupt the speaker's turn.)

have an important role here for gathering feedback. The lecturer needs to pace his delivery so that his audience have time to copy what is written up or drawn on the blackboard. Eye-contact seems to follow completion of drawing or touching a diagram, if not immediately then during the phrase referring to the diagram:

```
T10                x
-you can just use straight pieces of wood
```

where, as in dyadic interaction, the speaker watches his listener(s) to judge the effect of a particular phrase (Kendon 1967). We may note how eye-contact is maintained throughout the phrase.

```
                        T1   x.....................
the fatter this thing is in the middle. the more
.....................................................
resistant it will be to being bent sideways,
```

a crucial point in the argument which is to follow. The independent hand gestures are not followed or accompanied as often by eye-contact. Another similarity with the use of eye-contact in dyadic interaction is noted in 7.16.

7.15 The lecturer's use of gaze-direction shows clearly his awareness of his audience. It is continuously directed toward the area of the blackboard where he has drawn the diagrams relevant to the topic of his exchange. This is demonstrated here where the lecturer maintains his gaze toward 1 on LBB and walks backwards to point to Ø on RBB. The audience's attention is directed solely at the relevant information on the blackboard.

7.16 Finally we may consider the way that discourse boundaries are signalled or marked kinesically. Just as the speaker in a conversation looks at his interlocutor at the end of an

utterance to show that he has reached a turn point in the interaction sequence (Kendon 1967), so here the speaker looks at his audience during his concluding remarks. Then eye contact is stopped and he moves to the demonstration bench where he consults his notes in silence. He will move away from the bench before beginning the next sequence, and if he needs to consult his notes during a sequence will move them along the bench or instead of standing squarely in front of them, lean over an invisible barrier to read them. Similar territorial behaviour is found in the Birmingham data. Scheflen (1964) notes that in dyadic interaction changes of posture accompany sequence changes in what appears to be a comparable way, an argument which Coulthard cites (1975).

7.17 The results of our examination, however incomplete, support the view that the lecture is an interactive situation. They emphasise that in this style of lecture-delivery the integration of text, visuals and gesture does not permit separation of the various elements. Certainly, failure to provide some comparable information in the course of language-training for foreign students would be to deprive them of assistance they can expect in the real situation they are preparing for.

7.18 Preliminary conclusions for the applied linguist designing Listening Comprehension materials suggest that simple audio-recordings for use with a tape-recorder or in a language-laboratory will be inadequate. Provision of 'real' lectures or lecturettes will probably not be a feasible solution*; there are many other ways of providing

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* It is sometimes possible to integrate them into a course; see Lancaster University Study Skills material.

visual information: through the use of booklets, flash-cards, video-tape, or tape-slide programs.

It remains to discover the most practical and adequate method. Having found the best way to link the spoken text to the appropriate visuals, provision must also be made for the student to have enough time to

i) absorb the information displayed, and
ii) record it in note-form

Obviously, this will never work as well as the feedback the lecturer can use to pace his delivery. Until a more thorough, wideranging study can be made, based on a large sample, it does not seem possible to recommend that all of the kinesic elements noted here should be brought to the students' attention. However, the behaviour linked with boundaries in the text, and particularly the para-linguistic cohesion of text and gesture in exophora could well be included in students' language training.

8. INTERPRETING DISCOURSE.

This section consists mainly of the revised version of a paper prepared for a seminar on discourse analysis of written text held at the University of Birmingham. It is included here because the problem it faces and the issues raised serve as a bridge between the preceding section of the report and what is to follow. The participants in the seminar each presented papers which took the following text as the subject for analysis. This revision owes much to that discussion.

Importance and Role of Photosynthesis

Ultimate energy source

The term photosynthesis literally means building

up or assembly by light. As used commonly, photosynthesis is the process by which plants synthesize organic compounds from inorganic raw materials in the presence of sunlight. All forms of life in this universe require energy for growth and maintenance. Algae, higher plants and certain types of bacteria capture this energy directly from the solar radiation and utilise the energy for the synthesis of essential food materials. Animals cannot use sunlight directly as a source of energy; they obtain the energy by eating plants or by eating other animals which have eaten plants. Thus the ultimate source of all metabolic energy in our planet is the sun and photosynthesis is essential for maintaining all forms of life on earth.

We use coal, natural gas, petroleum, etc. as fuels. All these fuels are decomposition products of land and marine animals and the energy stored in those materials was captured from the solar radiation millions of years ago. Solar radiation is also responsible for the formation of wind and rain and hence the energy from windmills and hydro-electric power station could also be traced back to the sun.

The major chemical pathway in photosynthesis is the conversion of carbon dioxide and water to carbohydrates and oxygen. The reaction can be represented by the equation,

$$CO_2 + H_2O \xrightarrow[\text{Plants}]{\text{Sunlight}} [CH_2O + O_2]$$

Carbohydrate

The carbohydrates formed possess more energy than the starting materials, viz. CO_2 and H_2O. By the input of the sun's energy the energy-poor compounds, CO_2 and H_2O are converted to the energy-rich compounds, carbohydrate and O_2. The energy levels of the various reactions which lead up to the above scale ('redox potential' given in volts) which tells us the energy available in any given reaction - this will be discussed later in Chapter 4. Photosynthesis can thus be regarded as a process of converting radiant energy of the sun to chemical energy of plant tissues.

8.1 Our initial approach to this text on photosynthesis is suggested by a system of analysis of spoken discourse (Sinclair and Coulthard 1975). We hope to show that adapting this reveals - if only for the example here - a particular difference and certain similarities between the written and spoken forms of language, and points as well to the need for a further system of analysis for text to take account of meaning. We offer an informal example of one kind of analysis we feel might be attempted.

8.2 The end which we have in view while making such analyses, is to see whether a particular approach to the description of a text - whether written or spoken - can reveal information about its structure which would be of use to the applied linguist, say a materials designer who wished to use the text in an English for Science course. For example on first reading the text our reaction was that its content was disorganised and somewhat confusing in its presentation: we feel that it is possible at least to suggest why this may be so in a short paper. A materials designer might wish to use such knowledge either to guide him in redrafting the text or in the preparation of exercises based on it.

8.3 The fact that we should even consider ascertaining to what extent discourse analysis of speech functions can be applied to written texts implies that we consider that there are similarities between the situation of writer and reader, and that of speaker and hearer. There are obvious differences such as the simultaneity, in general, of speaking and listening, and the fact that we may read a text 'uttered' centuries ago. Such differences need not detain us now. If we define the common situation that we have in mind as that where one person is permitted to dominate the interaction, even to the extent that his or her interlocutor accepts the passive role as customary, or is denied the right of reply, then it is probable that certain communicative functions will be shared by written and spoken text which have a common purpose. The manner of communication in lecture hall, or textbook is fundamentally similar: the lecturer, or writer is assigned the dominant role in the respective situations. His aim will be to convey a certain amount of information to his audience, and he will bring to the interaction certain presuppositions about the knowledge he and his audience share. There are a number of devices he may use to mark progression in his presentation, and to guide

or control the activities of his audience. Such functions for speech in the classroom have been described by Sinclair & Coulthard (1975) and were found to be linguistic. If there are similarities in the interaction between instructor and instructed, whether it is conducted in writing or in speech, then we might at first expect that the functions would have a common form of expression.

8.4 If we do not have such expectations, we would suggest it is because we have been taught the form these communicative functions take in writing, whereas the comparable conventions for speech are acquired. Let us exemplify the comparison from the text.

8.5 The first sentence of the text cannot be identified as the act underlying a focusing move or framing move, in Sinclair & Coulthard's terms. There is no linguistically expressed boundary exchange such as would be expected at this point in a spoken text and which, it is suggested, is an obligatory element of the next superior rank, the transaction. However, if there is no linguistically expressed boundary we have no difficulty in recognising the author's intention to mark one because of the paragraph indentation.

8.6 By making such an interpretation of the typographical layout of the passage, and then equating the author's exposition in each paragraph with a teaching exchange, and his conclusions (marked by 'hence' and 'thus') with Sinclair & Coulthard's act 'conclusion' (marked usually (by) the lexical items "so" or "then"), we can arrive at the specified structure of a transaction. We have in paragraph one of the text: a 'marker' (realised by indentation), the act which (followed by a silent stress) constitutes a framing move and above that a boundary exchange; a 'starter' (the literal meaning of photosynthesis) and four 'informative's (statements in 4 sentences), acts which

together may constitute an opening move which is the obligatory element of a teaching exchange; a 'conclusion' (marked by 'Thus') the act which realises a focusing move and above that a boundary exchange.

The three exchanges form a transaction. We might then say that this text is composed of three transactions, and that at this level its structure is comparable with that of a (spoken) 'lesson' we can imagine in paraphrase of the text.

Differences seem to lie at the lowest rank, that of the acts which are the surface realisations of the other discourse ranks, and the difference is one of form rather than function.

8.7 The text is presented here with a title and sub-title which we think are easily paraphrased as the kind of cataphoric statement which frequently precedes a lecture, and which might be satisfactorily described as an act of metastatement, constituting a focusing move and above that a boundary exchange. It is easy enough to imagine how the exchange would be realised in speech:

> right. well today. I'm going to talk about the. eh. importance and role of. photo-synthesis. and I'll be saying something. about the ultimate **energy source.** now. the term pho...

We interpret the subtitle as an act of 'comment' in the focussing move of the boundary exchange, which is the only classification which Sinclair & Coulthard permit: there cannot be a second focussing move or metastatement. Two points arise here. As we will show in 8.11, we think the author is making two metastatements, doing which misdirects

the reader, producing confusion in the interpretation of the text. The boundary structure suggested by Sinclair & Coulthard is correct; but since the system of analysis does not take account of meaning relationships between different levels of the text, and it is possible to gloss the subtitle as comment, the system fails to block this as a deviant structure.

8.8 We are not aware that the system would pretend to be able to do what we are asking of it. For a particular situation it reveals certain aspects of speech which were not previously described; the comparison made earlier with conventions of lay-out for writing should not be allowed to trivialise its achievements. The examination of a written text does emphasise, however, that this technique is concerned with the tactics of spoken discourse and that we do need in addition a method of interpreting the content structure. This is the same sort of criticism that Chomsky makes of Searle: 'the point is, I think, that the "communication theorists" are not analyzing "meaning" but rather something else: perhaps "successful communication"' (1976:68). We will return to this point below.

8.9 If we look again at the informal analysis sketched in 8.6 we find that there is a bunching of 'informatives' in the chunk of text between the boundaries. This is typical of this kind of didactic text as is revealed in the analysis of lecture text (see 5). Given the nature of such texts (and a descriptive system owing much of its terminology to Halliday (Sinclair & Coulthard 1975:24)), it is only what we might expect to be the dominant language function. 'Informative' is a label Halliday used for one of the 'macro-functions' of language: that which 'comes to dominate, if not the adult's use of language, at least his conception of the use of language' (1975:35), and later he remarks that, 'the informative function... seems to be in some sense

secondary' to other language functions (1973:37). So we find that a large area of text is only characterized in a very general way which is not even adequate in a description of communication. This system of analysis glosses the metalinguistic devices of the utterer, the devices used to guide the reader/hearer through the text. However, the materials designer needs to interpret and characterize the 'informatives', the network of meaning relationships that constitute the message the hearer/ reader is expected, and wishes to interpret. So we want to consider next one possible way of approaching discourse from a viewpoint more analogous to that of the reader/ hearer; we believe that this will be more informative for the materials designer.

8.10 We will only present this analysis in an informal way, but do this in the belief that a more rigorous treatment would only confirm what we have to say, and that this sketch will be sufficient to bring out the difference in the information to be gained from the analysis outlined above and that to be got from considering semantic relations in the text.

Our main aim will be to elucidate through the analysis the way in which we find the text to be confusing from the viewpoint of the reader. We feel justified in generalizing and talking of any reader of this passage after finding that our own confusion is shared by others.

8.11 The first point of confusion stems from an assumption that the title and subtitle are in apposition, a relationship which M. H. Short (personal communication) suggests we may generally assume. If it is true to say this is a presupposition that the reader brings to his reading of any text, then the cause of any confusion here is easily explained. On first reading the text we took the subtitle,

'Ultimate Energy Source' to be a gloss on the title, 'Importance and Role of Photosynthesis', because it apparently explains both the importance: photosynthesis is the ultimate source; and the role: photosynthesis is the source of energy. Only after reading the text is it apparent why the subtitle should be interpreted separately, why as we said in 8.7 it is a separate meta-statement. This will become clear after analysis of the text. However, it seems that it is already possible to explain one element of the confusion by taking an approach from the reader's standpoint.

8.12 We want to suggest that one approach the reader may make to interpreting the text is to follow certain fundamental semantic relations through the text and to develop from these his own paraphrase of the original. If the presentation of these relations does not meet certain assumptions or expectations about the combinations of such relations, then the reader will find the text ungrammatical (in terms of discourse structure): he will be confused. Here we are extending an idea of Kahn's to suggest that the meaning of a text 'must be identified with the set of possible paraphrases' of the fundamental semantic relations in it.* In the text under consideration several relationships are not evident in their surface realisation, although it is possible to produce paraphrases where they are in fact clarified. The author of the text fails to show that he is concerned with the role and importance of photosynthesis in building up energy, in one form, using energy transmitted,

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* Space does not permit us to show how Kahn's system of analysis reveals general structures for texts. The system he proposes is for narrative; however, we believe that it is possible to analyze scientific texts in the manner he describes and characterize a set of plot relations for, say, this text on photosynthesis; e.g.

sun: solar energy : : plant : chemical energy
sun: plant : : plant : herbivore.

Such an analysis is obviously topic-specific whereas a communicative analysis is situation-specific.

in another form, by the ultimate source of all energy for this planet, that is to say, the sun. This is, we think, a correct interpretation/paraphrase of title and subtitle. That this is the intended information will only become evident at the end of the first paragraph, when the reader who has taken the other interpretation, suggested in 8.11, finds that he has been misled and needs to return and reinterpret the titles he had just read. Since this appears to be an introductory text the mistake cannot be ascribed to a lack of scientific knowledge the author assumed in his readers.

8.13 Throughout the text, as in the title, the author flits from the topic of photosynthesis to that of energy and back again. He begins by giving two definitions of photosynthesis, but immediately follows these with a general statement about all forms of life, not just that -plantlife- which uses the process. This serve to introduce the topic of energy, which, as it recurs in the text will be used to refer to a number of different forms of energy, although we do not think it is clear until we reach the third definition of photosynthesis, in the last sentence of the passage, just how many different forms there were. When, in the second paragraph, in an unacknowledged and unsignalled aside, the author introduces first fuels as a source of energy and then wind and rain, there is an evident difference. However, the use of 'energy' in sentences 4 and 15, and the paraphrases to be made of them, may show further why this text is a problematic one for the reader.

8.14 Here is S4:

> Algae, higher plants and certain types of bacteria capture this energy directly from the solar radiation and utilize the energy for the synthesis of essential food materials.

In making a paraphrase of S4 the reader may interpret 'this energy' and 'the energy' to be synonymous references to the 'energy for growth and maintenance' just mentioned in S3. There is no information to suggest that he should do otherwise. Compare this with S15:

> Photosynthesis can thus be regarded as a process of converting radiant energy of the sun to chemical energy of plant tissues.

In other words the two occurrences of 'energy' in S4 are co-referential, but not with that in S3, 'energy for growth and maintenance' i.e. food, the 'energy-rich' carbohydrates synthesized by using radiant energy form the sun, but not derived from it. 'Energy' in S4 refers to energy from solar radiation. All other references to 'energy' in paragraph one are in the S3 sense, but not limited to plant-food. 'Energy' in the second paragraph refers to either kinetic energy, or sources of radiant energy. Only when he has encountered these, and inferred how they may or may not be related to photosynthesis, is the reader told in S13 that solar energy is not plant-food. Because he finds that a hyponymic term has been used to refer to a specific concept before the latter had been introduced the analyst may revise his paraphrase of the text.

The reader in a hurry may not; on his way through the text he may have been distracted by finding that his expectations were wrong, been puzzled by some of the author's associations not evidently related to the major theme, and been misled by items that were not co-referential as they seemed to be in the text. It appears likely that in Kahn's sense such a reader's paraphrase of the text will not necessarily be identifiable with the set of possible paraphrases: he will not have acquired the information the author wished to convey.

8.15 If this assessment is correct, and if the second approach suggested contributed to demonstrating this, then it seems such a reader-based approach to analysis of text may be more revealing than the first one used. That is, it can tell us something about a deeper level of the text. What it has shown here could be of use to a materials designer; it has implications for the adaption of science texts for language teaching, and also for certain reading strategies the learner may need to acquire. The first approach only succeeded in showing that the text had what it recognises as the functional structure of discourse; it was not able to show that at a deeper level of structure, the semantic relations in the text, the passage did not succeed in developing its 'plot', the network of these relations. This implies that if we are to interpret the 'informative' literally, then the first approach will accept an informative act that may not succeed in its function, although it correctly identifies the underlying intention. It may be felt that in essence the two approaches are not comparable, that we can only compare applications; however we think that these analyses have implications for theories of communication.

As Yorick Wilks (1974) has said, 'understanding requires... some attempt to interpret... utterances', and interpretation of intention alone is not sufficient 'provision and formalisation... of the sorts of knowledge required to understand areas of discourse'. It is necessary for an adequate theory to take account of the hearer/reader's devices for interpreting discourse, just as much as the speaker/author's devices for generating discourse (cf Chomsky, 1966, 1976).

8.16 Other lines for attempting to understand interpretation are possible. Marples (1974) suggests an algorithm for the interpretation of engineering problems,

showing how either the statement of the problem or the lack of knowledge required to set up the algorithm on the part of the student may lead to the failure of the teaching aims of the problem. Work by Bundy, Luger & Stone has built on his suggestions in developing Artificial Intelligence programs to solve engineering problems. They consider, for example, how an inadequate AI program may fail to solve an engineering problem in Mechanics because like a weak student it does not bring to the task the presuppositions required for obtaining the correct solution (see Bundy et al 1975 and 1976). The problems they are exploring and techniques and mechanisms of communication they may reveal are obviously relevant to understanding a process common to the native and foreign student. At this level the process of both listening and reading have much in common (cf Kavanagh & Mattingly 1972) but now we turn to the specific nature of listening.

9. SPEECH PERCEPTION.

> Probablement ce qui fait défaut, la première fois, ce n'est pas la compréhension mais la mémoire. (Marcel Proust)

9.1 Linguistic descriptions tell us about what we hear; in order to identify the comprehension skills which the foreign learner must acquire, we also need to consider how we hear. Linguistic complexity in terms of a theoretical description is not necessarily the same as perceptual complexity.

> Normally in sustained communication the hearer 'loses' between 20% and 40% of an utterance (Gurney 1973: 96-7).

We are not aware of any linguistic description that takes that fact into account, it emphasises just how far the 'ideal speaker-hearer' of some linguists' theories is from reality.

It also emphasises the importance for the foreign student of understanding not only the syntactic system of the language, but also the discoursal and cohesive systems through which the less-than-ideal speaker can guide the errant attention of his hearer to the message elements he considers most important.

9.2 As Slobin ruefully observed some years ago, it is 'impossible to review all the published research in this area - let alone the unpublished'. Although it is almost exclusively research which is based in first language experiments it is astonishing how few applied linguists have considered the implications of the many findings available, although there are, of course, notable exceptions such as Wilga Rivers. Before selecting a few points in particular to comment on it is worth remarking that a much wider survey would be of considerable potential use, and better still a programme of comparative experimentation that would take second language learners as its subjects.

9.3 The fact that we lose part of the soundstream created by a speaker is not necessarily a matter for concern to the native hearer, 'as everyone has had occasion to note, we often need little more than a partial understanding of what is addressed to us in order to cope satisfactorily' (Garrett 1974: 98). Perhaps we are able to do this because 'much of the decoding procedure bears no direct relationship with linguistic rules' (Fodor & Garrett 1966). Let us take the case of the sound system.

9.4 Many tests and courses lay emphasis on the foreign learner's ability to discriminate the different significant segments of the target language. Two points arise here which we do not think are usually taken into account.

Firstly, the high rate of information transfer which is achieved in human speech is only possible because the acoustic signal is perceived in syllable sized units:

> the fastest rate at which sounds can be identified is about 7-9 segments per second; meaningful sound distinctions - segments - are transmitted at 20-30 segments per second (Lieberman 1975).

A telling comparison can be made with visual perception: if we are shown images at the rate of 7 to 9 per second we can perceive each individual image; at rates of over 16 per second we are conscious of one image. Sequential presentation of successive photographs at a rate above 16 per second will give the illusion of perceiving motion, as the Lumière brothers discovered.

9.5 Secondly, on the basis of general phonetic descriptions, we think many language teachers assume that for example the sound represented by 'd' in 'dean', 'darn' and 'adapt' is the same. This is not the case, and the task of speech perception at this level is not only different from what is suggested by phonetic representations but more complicated. Cooper (1972) quotes an article of Lieberman to show that for the word /bæg/ an artificial spectrogram 'shows that the influence of the initial and final consonants extend so far into the vowel that they overlap even with each other, and that the vowel influence extends throughout the syllable' (p. 28). In other words, the so-called separate speech units, the phonemes, are in fact being transmitted in parallel. The examination of comparable patterns where the vowel or consonants are changed show that this influence is general. It is not surprising to find that although we can hypothesize the target position of the articulators associated with some phone, as phoneticians do, such positions 'are actually attained only in simple cases. More commonly, targets are merely approached, and the different articulators participating in the production of one phone do

not generally come closest to their targets at the same time' (Mattingly 1975:66). As he said in an earlier paper, 'the task is to learn to hear a phoneme as invariant over different words and produced by different speakers' (Mattingly 1972:136). In first language acquisition this does not require the child's learning to isolate specific sounds (Turner 1975:105), and it seems questionable as an assumption for language teaching. We will now turn to a consideration of other linguistic levels.

9.6 Adult native speakers are not very successful at identifying isolated words in their own language, so why should we expect the foreign learner to achieve better results here? We base this comment on an experiment reported by Wanner (1973). Subjects were asked to identify sample recordings, obtained under ideal acoustic conditions, where they heard just the first word on the recording, then the first two words and so on up to eight. Intelligibility for each recording was scored in terms of the percentage of words correctly identified and there were 100 eight word samples each broken up. 'When single words were played to listeners, average intelligibility dropped as low as 30% for some speakers... despite the high quality of the recordings, despite the fact that the listeners were told how many words to expect on each trial, and despite a method which provided repeated exposures to some portion of most of the speech tested. In order to achieve 90% intelligibility, listeners had to hear recordings containing an average of 7.5 words and lasting over 1.5 seconds' (1973:166-7).

9.7 Two points arise from these results: that speech recognition does not take place in terms of minimal units, and that it is not the passive language skill that it has often been supposed to be: it requires an active

interpretive skill on the part of the hearer.

9.8 We can find evidence for this interpretation of the listening skill in another experiment. Stress is supposed to provide the clue required for distinguishing between 'light housekeeper' and 'lighthouse keeper' in speech. Lieberman (1967) repeated the original experiment which demonstrated that it was not stress but the temporal interval between the vowel peaks which hearers used to differentiate one from the other. In a later experiment where a recording of one form was spliced into a context sentence for the other, he found that hearers perceived the form suggested by the context: they 'heard' what they expected. Elsewhere (1965) Lieberman has shown that our interpretation of intonation may depend a great deal on information from the hearer's perception of the syntactic form of a message.

9.9 Other experiments which contribute to support what Wanner calls the 'inside-out' theory of speech perception, that the hearer matches the incoming signal against an hypothesized form of the message, also, incidentally, support some syntactic theories. Various experiments, but particularly those conducted by Bever, Fodor and Garrett support the syntactic notion of phrase and word boundaries. Using electronic splicing techniques a number of paired sentences sharing a common, identical segment were recorded. The experimenters predicted that for pairs such as

> As a result of their invention's <u>influence/the company was given as award</u>
> The chairman whose methods still <u>influence the company / was given an award</u>
> In her <u>hope of marrying / Anna was surely impractical</u>
> Your <u>hope of marrying Anna /was surely impractical</u>

where the underlined part in each was the identical recording, subjects would tend to perceive the boundary at the point indicated by the slash. The difference in perception could

be predicted by phrase structure, and the results supported this, showing that the hearer uses his knowledge of the rules of language to assign a structure to a sentence, and does not do this on the basis of any acoustic cue in the soundstream (cf Wanner 1973, Slobin 1971).

9.10 The results of these psychologists' investigations emphasise the need for students to acquire mastery of the phonological and syntactic systems of the target language, and by implication or extension, the rhetorical system. This mastery need not be productive and may just be passive, in the sense that the student is unable to speak, but this does not diminish the active, inside-out nature of perception; it simply means that the student is like an aphasic with an encoding disturbance (cf Jakobson 1971: 83-4).

9.11 A number of experiments have suggested that certain syntactic forms are more difficult to perceive than others; because of their complexity, in transformational terms, they take up more 'space' in the initial language processing in the short term memory, and take longer to decode (cf Slobin 1971; Green 1975).

On the basis of this Wilga Rivers suggests that students should be taught to re-encode messages in the least complex (and least memory-consuming) form, the Simple Active Affirmative Declarative (1971:130). However, further experiments suggest that this is not so (although nobody is disputing the difficulty of processing self-embedded sentences!). Context of use may be just as influential on the rate/success of understanding a sentence. 'One cannot speak of the complexity of processing a sentence of a given grammatical form in the abstract. Sentences are used to express meanings in situations, and language allows for a range of syntactic expressions because they are called for in a range of communicative contexts... a passive sentence need not always be more difficult to understand than an active... a negative...

than an affirmative. Rather it seems that people prefer to describe certain types of situations using certain types of sentences' (Slobin 1971:33-4). This evidence reinforces the sociolinguistically based theories of authentic language use that underlie English for Specific Purposes. Again older language teaching theories tended to produce learners who suffered from a language deficiency comparable with a form of aphasia where the patient is unable to code-switch for codes other than his idiolect (classroomese in the case of the student), where he 'hears the voice but not the words' (Jakobson 1971:61).

9.12 Mastery of the language system will bring with it the ability to exploit the redundancy of the code, and many of the studies of learners' difficulties emphasise their inability to do this. The notion of redundancy in a linguistic message was advanced by two communications engineers, Shannon and Weaver (1949). The redundancy of the encoding of a message is calculated as a ratio of the signal to content, and on this basis they suggested that written English was approximately 50% redundant; that is to say that in statistical terms only half the signal is necessary to transmit the message. In other words much of the message must be predictable; if we find a torn scrap of paper with 'parli-' and 'exche-' written on it we can predict with absolute certainty that the letters on the missing scrap are 'amant' (or a derived form) and 'quer': given the initial combinations, these final ones are the only ones possible in English. On the basis of these calculations Hockett (1953) worked out that spoken English, in terms of signal transmitted through sound segments, was approximately 99.9% redundant. This, as he pointed out, is without taking account of the predictability of the message which is increased by the context of situation, kinesic signals and the hearer's knowledge about the speaker. This would explain why intimate speech can be more telegraphic and therefore less redundant than the comparatively formal language of the lecture hall.

9.13 Speech is not a particularly efficient channel for communication since it is liable to disturbance in transmission by many kinds of noise (used in the technical sense of 'interference'). The redundancy of the signal ensures greater likelihood of satisfactory reception, which is why the 20% to 40% loss quoted by Gurney is not important: it is the utterance which is lost but not the message. Environmental noise, rapid speech where the articulators come nowhere near the ideal point of articulation, all such interference can be coped with by the native hearer who will supply the lost information from the signal on the basis of his knowledge of the language. Then 'since predictability reduces the amount of uncertainty, it follows that the more predictable or redundant a language message is, the less information it will contain and the easier it will be to perceive and memorize' (Green 1975: 108). Lack of knowledge of the constraining rules of English mean that the foreign learner is unable to exploit the redundancy.

9.14 As the quotation from Greene indicates, the consequence of this is that the learner's immediate memory systems are overloaded, and he is then unable to retain enough of the signal to process it. Although the speech signal is transmitted serially in real time, it is not possible to interpret it as it is received: perception of the message can only take place when certain meaning relations are clear. Lashley (1951) pointed out that even production is not serial: when writing in a hurry we may find ourselves including letters in the word we are writing from the word which is to follow. Preparation for production precedes execution. The converse happens in perception; when we hear a sentence such as

> rapid/**ɹaɪtɪŋ**/ with his uninjured left hand saved from loss the contents of the capsized canoe

it is only eighteen syllables after it has first been uttered that we realise how we are to interpret the second word, 3 to 5 seconds later.

9.15 Perception is not a unidirectional process but a continuous one that must also be completed before the received signal fades from the primary memory system. The foreign learner may find that although he can perceive each individual word he is unable to make the necessary interpretive relations between the different parts of the message. Now while redundancy may assist the reception of the message another characteristic of the code assists rapid interpretation. As we discussed earlier in considering the perception of sound segments, it is not possible to isolate the segments from a syllable such as 'bag'. 'The syllable is carrying information about all of them at the same time (parallel transmission) and each of them is affected by its neighbours (context dependence). Lieberman asserts that comparable encoding operates throughout language: transformations bring about a similar restructuring and temporal compression in the syntactic conversion between deep and surface structure... encoding increases speed of transmission through compression of the message in a hierarchical structure; as Miller* has shown, this permits us to deal with substantial quantities of information despite our limited memory capacity' (Cooper 1972:29).

9.16 We find then that in order to use a language students need to know a great deal about what is likely to follow at any given point in a spoken message, they must know what the possible sequences are at all levels of the language. If they are to reconstruct a message they must have some previous knowledge as hearers to build on. Like a native

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* 1956 'The magical number seven, plus or minus two'.

listener they need to be capable of correcting any error which the speaker makes, of supplying the right word when the speaker is lost for it. 'Decoding (means) determining "what the message must have been". This factor is so powerful that whenever there is conflict between what the listener thinks is likely and what actually reaches the ear, it is more frequently the first that wins' (Fry 1970: 32). Until they achieve this level of ability students are likely to find that they do not comprehend what they listen to. It is not enough to be able to hear in order to understand.

10. PUBLISHED LISTENING COMPREHENSION MATERIALS.

10.1 Specialised English courses already published do not include authentic listening comprehension materials, even if we take a weak definition of 'authenticity' such as 'showing the linguistic features of extended monologue discourse'. For example, the OUP Focus series have accompanying tapes for each textbook, but the recordings are quite simply of the texts from the books read aloud. As far as can be ascertained courses which are in preparation at the moment are not planned to include any more authentic listening material.

It is obvious in the light of previous sections of this report that such materials are most unlikely to offer the kind of language training required for listening comprehension, however good they may be in other respects. Many courses assume that listening comprehension can be practised in a language laboratory, where there is no possibility of supplying the visual information that only the blind are deprived of in normal, extra-classroom language use.

10.2 Cook (1975) similarly notes the lack of published ESP material for aural skills. There seems to be more written about and published for listening comprehension tests than about the acquisition of the skill, doubtless because of the influence of examinations. Many of the

considerations made by language testers are irrelevant to teaching: for example, the low reliability of aural tests (Davies 1965), or advocating that tests should be short and free from any memory load (Ingram 1968). In preparation for understanding lectures the converse is necessary, as it would be in testing for ability to understand lectures (if memory load can be removed at all).

10.3 It is only possible to comment briefly on those KAAU materials which have been available; they are not a representative sample we have been told. However, some comments seem necessary because those examined fail to meet some of the criteria for listening comprehension materials this report moves towards defining. Our comments concern authenticity of text and authenticity of activity. The texts are not authentic, they are prose to be spoken and appear to be unillustrated, like the Focus recordings. The accompanying exercises are directed at a traditional assessment of comprehension mainly at word and sentence level (see 10.4). They do not require the student to re-exploit the information found in them (see 2). Consider the proposal to use dictation as a teaching device for listening comprehension in the first four weeks of the Medical College program. Dictation, if it were to have any value, would depend on language perception being a sequential process; to suggest that it requires any process of selection or attention to discoursal features is wrong. It is about as far removed from the activity for which these students are supposed to be being trained as an aural activity can be. Further, it seems unlikely that a sort of 200-word cloze dictation could give 'valuable practice for higher level types of prediction, involving the structure of a lecture for example', especially as research reveals that Cloze tests do not test prediction of structure above the level of the sentence; they do not test knowledge of discourse structure (J. C. Alderson, personal communication).

The learning activities proposed are inappropriate, because unauthentic; it is not clear how far the teaching is supposed to develop an awareness of lecture structure.

10.4 Certainly the texts for use in listening activities in the Communication Skills Laboratory are unauthentic in the terms we have used to define discourse. It is not clear how much if any visual information would be supplied with, for example, a text on cells. The accompanying exercises which test comprehension do not expect the student to understand or discriminate any item larger than a phrase:

> There are about .... cells in the human body;
> Specialized cells
> a) cannot .....
> b) have these characteristics 1 ..... 2 .....

Like so many note-taking exercises they appear to be an end in themselves, as if notes were taken during lectures to keep the hands occupied.

10.5 Since this paper first appeared a course 'to help students understand the English used in lectures and talks in specialized subject areas' has been published by Oxford University Press (McDonough 1978). The recorded texts accompanying the students' work books are extracts from authentic lectures in five disciplines. The material is intended essentially for self-study in developing the listening ability, with exercises to cover such areas as the organization of the lecture content, identification of stressed words*, spelling of 'important terminology', gapped dictation. We would like to see more instruction on interpretation of the different linguistic

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* but does not distinguish between discourse functional stress on a marker: "'now", and emphatic stress on important content: - "'force, 'energy and 'mass".

levels in material of this kind. Because it is a separate course, and not an element of an integrated course it does not include the reinterpretation of notes, information transfer exercises we believe this should work towards. It is disappointing to find a note such as this: 'the lecturer used slides and other visual material to illustrate his lecture. We have not reproduced this' (Computing p. 2). The visual element has an important role to play in increasing the potential avenues of interpretation open to the student in the discipline as much as to the foreign language student. The material does represent a step forward from what was previously available.

11. LISTENING AND TAKING NOTES.

11.1 The task that the students at KAAU have to be trained to is a complex one: they have to be able to receive a verbally and visually transmitted message; to decode and memorise parts of it after reception; to relate the newly received parts to the already perceived parts; to select from these the elements that they are to re-encode; and when this has been done the re-encoded parts are written or copied down. Much of the selection was done by the lecturer at Lancaster, and this seems to be common practice in science lectures. A satisfactory set of notes from the lecturer's point of view was, when we asked, an accurate record of what he had noted on the blackboard. Points worthy of correction were, for example, incorrect copying of a graph slope, making it too steep, or careless reproduction of a diagram. The need for accurate notes was paramount since they provided the information content for the practical tasks elsewhere on the course. Hence the comparatively slow meticulous presentation of information in comparison with an Arts course. On the basis of a small sample we found that native British students did not seem to expect (in their first year anyway) to supplement what they copied from the board with notes of what was said but

not written down by the lecturer. Recommended texts did not seem to have a very important part in introductory courses.

11.2 This then is the background to the consideration of the teaching task which follows in the rest of this section. We intend to consider some published and unpublished proposals, and then outline what, at this stage of the research, we feel are informed guidelines for developing the teaching of listening comprehension and note-taking to this kind of audience.

11.3 Wilga Rivers (1971:130f) suggests that attention should be given to the following points in developing listening skills:

(1) 'prolong the auditory image'.

This is to be done in order to help the student develop his initial memory store. For this she suggests that students should repeat to themselves the segments they have apprehended, first as stretches of sound, and then as syntactic groups.

(2) 'Early listening materials should be kept within the limits of structural patterns learned, so that rapid identification of syntactic groupings is possible'.

The notion that receptive skills are ahead of productive skills may be unhelpful here.

(3) 'Identify more precisely and interrelate items held in Short Term Memory',

here the ability to hold an auditory image for long enough to relate it to already stored chunks of the message would be exploited. It would require identifying chunks larger than a clause, if the student is ever to understand and retain lecture material.

(4) 'Recognize clues to question form, negation, coordination, ... purpose';

we would extend, or adapt these suggestions to include discoursal and cohesive features; 'identify immediately in order to discard them, prop words and hesitation words'.

(5) 'Develop a technique for extracting meaning immediately and directly from the foreign language text without relying on translation, or identification of lexical items alone to give the meaning.'

Her proposals also include ideas based on theories of perception in Transformational Grammar terms which have since been invalidated; the proposals reported here are still valid, and there are no grounds for doubting the theoretical principles that underlie them.

11.4 On specific techniques that can be used in preparing materials there is apparently little available. Articles such as those by Black (1971) and Ewer (1971), although they contain ideas which are moving towards authenticity of activity, pay little attention to the features which we have found in lecture discourse. James' suggestions (1975) are more interesting. From his experience of teaching foreign students in the UK he identifies three major problem areas where lectures are concerned: decoding, comprehending and taking notes. He describes a three stage course which uses texts of 60, 250 and 750-1000 words in length, 'written in formal lecture style, and pretaped by different tutors'. Valuable points are that students write during pauses, the frequency of replay of the tape is increased for weak students and decreased for the more fluent decoders and the students at the final stage are given a demonstration of note-taking. The course as outlined seems weak on the authenticity of the text used, without supporting visuals and does not appear to help students with identification of discourse structure.

11.5 Next we will outline some of the questions which we feel the materials designer and teacher should ask in order to evaluate either the problem of producing them, or materials which are offered for teaching listening skills for note-taking in lectures.

11.6 Is each text for use a piece of spoken discourse? In ideal circumstances each language teacher would be accompanied in the classroom by a science lecturer; the fact that this does not happen should not result in his reading a passage from a science book into a tape-recorder and calling it a lecture. A video-taped lecture, or a tape-slide program where the tape is of a real lecture, and the slides provide the appropriate, focussed visual information, these are in some senses typical classroom compromises for expediency. Their use would bring the situation of the learner closer to the target mode than any other method could.

11.7 Is there accompanying visual material? The learner should have available to him, and have to interpret simultaneously, at a very minimum the models, notes, diagrams that would be used in a university lecture.

11.8 Do the materials simulate the role/place of a lecture within the academic study scheme? Must the science information gained here be used elsewhere on the course? In the very early stages it may be enough to develop note-taking skills for themselves, but very soon the skill must be tested and further developed through the student's using them as his information-base for other science/language activities. This re-use rather than satisfactory marks seems likely to urge him to improve his ability in this skill, because it gives purpose to the language activity.

11.9 Is the science content of appropriate type and level? Obvious? Also, is it good science? Some EST textbooks are sadly inaccurate in terms of their content. An attempt to be very specific as to <u>content</u> may lead away from the more important strategies of argument common to the discipline area, and essential to the students' interpretive abilities.

11.10 Is there provision in the syllabus for teaching and giving practice in

reference
conjunction
substitution and ellipsis
phonology (elision, reduction, intonation, accents, discourse, features)?

The motivation for this should be obvious from the earlier sections of the report. To suggest teaching cohesion when some students may not have mastered some of the simpler basics of syntax may seem ridiculous. Obviously in those circumstances attention must still be paid to that level of language organization, however it is possible that improved command of higher language levels might bring improvements elsewhere as the learner is better able to process all levels of language, rather than attempt to operate on a restricted selection. Such limitations can make language use more difficult rather than easier.

11.11 Is there provision for teaching and practice in recognition of discourse features and their communicative function:

moves of focussing
describing
concluding etc.
acts such as the marker
conclusion
aside?

As with the features of cohesion and phonology the aim is to equip the student to cope better with the task of understanding a long spoken text, a task for which a knowledge of the lower levels of language organisation alone is not sufficient. Although this remains to be shown it is assumed that teaching a knowledge of structure at this

level would facilitate acquisition of the desired skills. Our decision to suggest teaching discourse structure mainly at the level of the move is motivated by the desire to find a chunk which is important in discourse terms and fairly close to a perceptual chunk of language. Learners should certainly also be made aware of the structure of lecture discourse at the rank of episode/ exchange and be made aware of its significance in terms of message-load. Acts, as described by Cook in particular, may be very small segments - 'I want' is classed as an Act of assertion - and a general ability to recognise discourse structure at this rank seems unnecessary for a language student, with the few exceptions listed. Recognition of the 'marker' set, as attention-getters, seems important for the student to recognise boundaries; the others are suggested for similar reasons based on their importance (or mark of unimportance: aside) in the message structure.

11.12 How is note-taking integrated with the other elements of the course? What provision is made for teaching it? Note-taking is often considered too idiosyncratic a skill to be taught, but its importance in comprehension strategy gainsays this. Before they can begin to make notes students will need to have developed considerable skill in speech perception. We assume that much of the early work that they will do in acquiring the discourse and cohesion systems will involve development of interpretation of meaning in text, which they will learn to recover directly, as Wilga Rivers suggests. At this stage in their ability they can use their understanding of the higher systems of language to guide them in selection of message-items to record. However, it should not be assumed that because their language control is fluent they need no help in note-taking. The teaching of this skill will need to progress through various stages, from guided exercises to free ones; demonstrations as James suggests;

practice in reducing the redundancy of the recorded message; use of abbreviations and signs, where any ingenuity of the individual's own invention may help; learning to exploit lulls, pauses, asides to record the notes; reinterpretation of the notes, which in the early stages might just involve using them to complete a true/false test, but later will require using them to complete assignments and experiments outside the 'lecture'.

12. CONCLUSION

The project completed the aims for the first year of work: it was possible to survey a large area of theoretical findings which all contribute to a better definition of lecture discourse. On the basis of these findings it proved possible to show the inadequacy of available listening comprehension materials and to indicate certain specifications for authentic materials and activities for students who require a knowledge of English to attend lectures on Engineering.

Our intentions for continuing lines of research are included in this paper; on the theoretical and descriptive side we are convinced of the important contribution to listening comprehension that can be made by studies of speech perception, particularly the process which the listener brings into play as the discourse unfolds; and in practical terms, such investigation, allied to that presented in this report, would influence crucially the type and form of exercises devised for listening comprehension practice.

APPENDIX

THE BRIEF

1. The project was set up to explore ways of describing textual cohesion and rhetorical coherence in texts of undergraduate engineering lectures; to evaluate published EST listening comprehension materials, and to suggest appropriate exercise types for use in the CSE project in Jeddah.

METHOD

2. The preliminary tasks were to obtain a corpus of recordings and to begin a survey of published and unpublished works in the relevant fields. During the course of the year these were extended to include kinesics and the psychology of speech perception; it seemed important that the preliminary work should be an investigation of all possibly relevant fields.

THE DATA CORPUS

3. Recording was undertaken with the collaboration of the Department of Engineering at the University of Lancaster. We made audio recordings of and transcribed
3 first year undergraduate lectures in electronics
3 first year undergraduate lectures in structures
1 first year undergraduate lecture in dimensional analysis
1 third year undergraduate lecture in structures;

audio and video recordings of
1 first year undergraduate lecture in structures with a transcription.

4. A record was also made of all diagrams and notes or calculations that the lecturer drew or wrote on the blackboard in the course of his lecture.

5. The video recording was made

   i to facilitate relating references in the transcript to diagrams etc. on the blackboard.

   ii to investigate the paralinguistic features of lecture discourse.

This was the last recording we made, and from its study it is evident that despite their cost, video recordings are essential in a study of this nature.

6. The recordings and transcriptions are held in the IELE at the University of Lancaster.

BIBLIOGRAPHY

Abercrombie D	1968	'Paralanguage' in Laver & Hutcheson (eds).
Aitchison J	1976	The Articulate Mammal, Hutcheson.
Argyle M (ed)	1973	Social Encounters, Penguin.
Argyle M & Dean J	1965	'Eye contact, distance & affiliation' in Laver & Hutcheson (eds)
Austin J	1962	How to do Things with Words, O.U.P.
Birdwhistell R	1968	'Kinesics' in Argyle (ed).
Bligh D	1972	What's the Use of Lectures? Penguin.
Black M	1971	'Graded Practice in Advanced Listening Comprehension' in ELTJ XXV.2.
Brazil D	1975	Discourse Intonation, University of Birmingham.
	1977	Discourse Intonation 2.
Bruton C, Candlin C & Leather J	1976	'Doctor Speech Functions in Casualty Consultations: Predictable Structures of Discourse in a Regulated Setting' Department of Linguistics, University of Lancaster. (Proceedings of the III International Congress of Applied Linguistics 1975, Hochschul Verlag, Stuttgart 1976.)
Bundy A, Luger G & Stone M	1975	Department of Artificial Intelligence: Working Paper 8: A Program to Solve Mechanics Problems Stated in English, Edinburgh University.
	1976	Mecho[1]; Year One, Department of Artificial Intelligence, Edinburgh University.
Cherry C (ed)	1974	Pragmatic Aspects of Human Communication, D Reidel.
Chomsky N	1966	Aspects of the Theory of Syntax, MIT Press.
	1976	Reflections on Language, Temple Smith.

Cook J R S	1975	'A communicative approach to the analysis of extended monologue discourse and its relevance to the development of teaching materials for ESP' unpublished M Litt thesis, University of Edinburgh.
Cooper F S	1972	'How is language conveyed by speech?' in Kavanagh & Mattingly (eds)
Coulthard M	1975	'Discourse analysis in English: a short review of the literature' in Language Teaching & Linguistics: Abstracts Vol 8, No. 2.
	1977	An Introduction to Discourse Analysis, Longman.
Davies A	1965	Report on Oral English Testing in West Africa.
(ed)	1968	Language Testing Symposium, O.U.P.
Ewer J	1971	'Further notes on developing an English program for students of science and technology' in ELTJ XXVI.1
Fisher B C & Kirkman A J	1978	'Teaching technical communication to undergraduate engineers' in IJMEE vol 6 no. 3.
Fodor J & Garrett M	1966	'Some reflections on competence and performance' in Lyons & Wales (eds), Psycholinguistics Papers, Edinburgh University Press.
Fry D	1970	'Speech Reception and Perception' in ed. Lyons.
Garrett M	1974	'Experimental issues in sentence comprehension: complexity and segmentations' in Cherry.
Green J R	1968	A Gesture Inventory for the Teaching of Spanish, Chilton Books: Philadelphia.
Greene J	1975	Thinking & Language, Methune.
Grice H P	1968	'Logic and Conversation' mimeo.
Gurney R	1973	Language, Brain & Interactive Processes, Arnold.
Hall E	1963	'A system for the notation of proxemic behaviour' in Laver & Hutcheson (eds)
	1964	'Silent assumptions in social communication in Laver & Hutcheson (eds).

Halliday M	1973	Explorations in the Functions of Language, Arnold.
Halliday M & Hasan R	1976	Cohesion in English, Longman.
Halliday M McIntosh A & Strevens P	1964	The Linguistic Sciences & Language Teaching.
Hasan R	1968	Grammatical Cohesion in Spoken & Written English Part 1 (Program in Linguistics in English Teaching), Longman.
Hockett C	1953	Review of Shannon & Weaver in Language 26.
Holes C	1972	'An Investigation into some Aspects of the English Language Problems of two groups of overseas postgraduate students at Birmingham University' unpublished M.A. dissertation.
Hutchinson T & A G Waters	1979	'Communication in Technical Education: implications for course design' in ELT Documents British Council.
Ingram R	1968	'Attainment & Diagnostic Testing' in Davies (ed).
Jakobson R	1971	Studies on Child Language & Aphasia, Mouton.
James K	1975	'Note-taking in Lectures: Problems & Strategies', in English for Academic Purposes, BAAL/SELMOUS
Kahn E	1974	'Algebraic semantics for narrative' Linguistics (The Hague) 141.
Kavanagh J & Mattingly I (eds)	1972	Language by Ear and by Eye, MIT.
Kendon A	1967	'Some functions of gaze-direction in social interaction' in Argyle (ed).
La Barre W	1947	'The cultural basis of emotions and gestures' in Laver & Hutcheson (eds)
Lashley R	1951	'The Problem of Serial Order in Behaviour' in ed. Saporta 1961 Psycholinguistics.

Laver J & Hutcheson S (eds) 1972 Communication in Face-to-Face Interaction, Penguin.

Lieberman P 1965 'On the acoustic basis of the perception of intonation by Linguists' in Word XXI.

1967 Intonation, Perception & Language, MIT.

1975 On the Origins of Language, Macmillan.

Linden E 1976 Apes, Men & Language, Penguin.

Lyons J (ed) 1970 New Horizons in Linguistics, Penguin.

Marples D 1974 'Argument and technique in the solution of problems in Mechanics and Electricity'. CUED/C - Educ/TRI Department of Engineering Memo, University of Cambridge.

Mattingly I 1972 'Reading the linguistic process and language awareness' in Kavanagh & Mattingly.

1975 'The Human Aspect of Speech' in eds. Kavanagh & Culting, The Role of Speech in Language, MIT.

McDonough J 1978 Listening to Lectures OUP.

Mehrabian A 1968 'Inference of attitudes from the posture, orientation & distance of a communicator' in Argyle (ed).

Montgomery M 1975 'Lectures: a survey of the current literature' unpublished. University of Birmingham.

1977 'Some aspects of discourse structure and cohesion in selected science lectures' unpublished M.A. thesis, University of Birmingham.

Morrison J W 1974 'An investigation of problems in listening comprehension encountered by overseas students in the first year of postgraduate studies in science in the University of Newcastle upon Tyne

Mountford A 1975 'Discourse analysis & the simplification of reading materials for ESP' Unpublished M. Litt. thesis, University of Edinburgh.

Neisser U 1967 Cognitive Psychology, Century Croft.

Pimsleur P & Quinn T (eds) 1971 The Psychology of Second Language Learning, C.U.P.

Riley P 1975 'A model of the integration of kinesics in discourse analysis' CRAPEL, University de Nancy II.

Rivers W M 1971 'Linguistic & psychological factors in speech perception and their implications for teaching materials, University of Illinois.

1972 Speaking in Many Tongues, Newbury House.

Scheflen A 1964 'The significance of posture in communication systems' in Laver & Hutcheson (eds).

Searle J R 1969 Speech Acts O.U.P.

Shannon C & Weaver 1949 Mathematical Theory of Communication, Illinois University Press.

Sinclair J McH & Coulthard M 1975 Towards an Analysis of Discourse, O.U.P.

Slobin D 1971 Psycholinguistics, Scott, Foresman.

Sommer R 1965 'Further studies of small-group ecology' in Laver & Hutcheson (eds).

Turner V 1975 Cognitive Development, Methuen.

van Dijk T A 1972 Some Aspects of Text Grammars, Mouton.

Wanner E 1973 'Do we understand sentences from the outside-in or from the inside-out?' Daedalus 102.

Wijasuriya B 1971 'The occurrence of discourse markers and inter-sentence connectives in university lectures and their place in the testing and teaching of listening comprehension in English as a Foreign Language' M.Ed. thesis, University of Manchester.

Wilks Y 1974 Natural Language Understanding Systems within the AI Paradigm, Stanford Artificial Intelligence Laboratory Memo AIM-237. Computer Science Department, Stanford University.

Wright P 1977a 'Presenting technical information: a survey of research findings' in Instructional Science 6.

1977b 'The communication of scientific and technical information' in Journal of the Institute of Scientific and Technical Communicators 32.